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Title Slide: Data Collected Through the International Assessment Program Studies

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NCES, through its International Activities Program, or IAP, coordinates the participation of U.S. students, teachers, and schools in various international education studies. NCES oversees the national implementation of these studies, including the Progress in International Reading Literacy Study (PIRLS), Trends in International Mathematics and Science Study (TIMSS), and Program for International Student Assessment (PISA), and the national analysis and reporting of the data collected.

This module provides more detailed information about some of the topics and components of the studies described within the introductory module.

There are two ways to access the information within this module. You can click on one of the links above, which will take you directly to detailed information about either PIRLS, TIMSS, or PISA. Or you will automatically be advanced to the next slide within the module, starting with PIRLS. At the end of each study section of the module, you will be provided with two buttons, one that will return you to this IAP Studies slide, from which you may either select another study detailed within the training module, and one to exit the module completely.

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PIRLS is a paper-based assessment that includes both multiple-choice and constructed-response questions. Ten passages, including both stories and informational texts, are used to provide a valid and reliable measure of reading achievement. There are a total of 135 items in the PIRLS assessment, which is more than 6 hours of total testing time. However, in order to minimize respondent burden, each student is not administered the entire test. PIRLS used a multiple matrix sampling technique with a rotated block design to distribute the assessment material among students, yet retain linkages necessary for scaling the achievement data with Item Response Theory, or IRT, models.

In this approach, passages and accompanying questions are clustered in blocks. The blocks, in turn, are distributed across a set number of booklets and the PIRLS Reader. The PIRLS Reader is a short anthology of a variety of reading texts. Each student completes only one of the 12 booklets or the Reader. Thus, this matrix sampling approach enables PIRLS to adequately measure reading literacy in each education system while limiting the number of items each student is asked to answer.

The distribution of blocks across booklets in a systematic way links the booklets to enable the achievement data to be scaled using IRT methods, as discussed in the Methods and Procedures in TIMSS and PIRLS 2011, which can be accessed by clicking on the corresponding underlined screen text. Additionally, more information regarding matrix sampling can be found within ‘Principles of Multiple Matrix Booklet Designs and

Parameter Recovery in Large-scale Assessments', which can be accessed by clicking on the underlined screen text 'multiple matrix sampling approach'.

PIRLS results are presented in two ways: numerical scale scores and the percentages of students reaching defined international benchmarks. International benchmarks provide a way to interpret the scale scores by describing the types of knowledge and skills students demonstrate at various points on the PIRLS scale.

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The PIRLS assessment is given in two 40-minute parts with a 5- to 10-minute break in between. The items are assembled separately into 10 blocks, half of the blocks measuring the literary purpose and the other half measuring the informational purpose. Each of the 12 booklets and the PIRLS Reader contains two blocks in total. Each block contains at least 15 score points, made up of approximately 7 multiple-choice items (1 point each), two or three short-answer items (1 or 2 points each), and one extended response item (3 points). The exact number of score points and the distribution of question types per block differ, as different texts vary with different types of questions.

As shown in the table, four literary blocks and four informational blocks are assigned to 12 booklets according to a specific plan that enables linking among booklets and balances position effects. Each of blocks L1 through L4 and I1 through I4 appear in three of the 12 booklets, each time paired with a different block. The pairing of blocks in these booklets ensures that there are proper linkages both among the literary and among the informational passages and also between the two purposes for reading. The remaining two PIRLS blocks (one literary and one informational) are presented in a magazine format in the PIRLS Reader.

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In all, PIRLS takes 1½ to 2 hours of each student's time, including the assessment and background questionnaire (the latter which takes approximately 30 minutes).

For PIRLS 2011, six of the 10 test blocks from previous assessments were kept secure and carried forward to the 2011 assessment, allowing for the evaluation of trends across years of the PIRLS assessment. The four remaining blocks were redesigned with 60 new items. Of the 135 total reading items included in the PIRLS 2011 assessment, 74 were multiple choice and 61 were constructed response. Each multiple-choice item was worth 1 score point. Constructed-response items were worth 1, 2, or 3 points, depending on the complexity of the items. Constructed-response items worth more than one point could receive partial or full credit. The PIRLS 2011 assessment framework specifies that no more than 50 percent of the score points be from multiple-choice items—a goal that was achieved in the 2011 assessment: Approximately 42 percent of the score points came from multiple-choice items and 58% came from constructed-response items.

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As part of the PIRLS dissemination strategy, approximately one-half of the assessment items were released for public use after the previous round. To replace the released items, education systems submitted items for review by subject-matter specialists, and additional items were written by the IEA Reading Review Committee in consultation with item-writing specialists in various countries to ensure that the content, as explained in the frameworks, was covered adequately. Items were reviewed by an international Reading Item Review Committee and field-tested in most of the participating education systems. Results from the field test were used to evaluate item difficulty, how well items discriminated between high- and low-performing students, the effectiveness of distracters in multiple-choice items, scoring suitability and reliability for constructed-response items, and evidence of bias toward or against individual countries or in favor of boys or girls.

Grade-appropriate language and content is also evaluated for new field-test items. To view PIRLS items that have been publicly released, click on the underlined screen text, PIRLS released items.

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PIRLS focuses on three aspects of reading literacy: purposes of reading; processes of comprehension; and student reading behaviors and engagement. The first two form the basis of the written test of reading comprehension. The student background questionnaire addresses the third aspect.

In PIRLS, the "Purposes of reading" domain refers to the two types of reading that account for most of the reading young students do, both in and out of school: (1) reading for literary experience, and (2) reading to acquire and use information. In the assessment, reading narrative fiction is used to assess students' ability to read for literary experience, while a variety of informational texts are used to assess students' ability to acquire and use information. Shown is the percentage of the assessment's score points (or "testing time") targeted to each reading purpose. About half of the PIRLS assessment is devoted to each of the two reading purposes.

Processes of comprehension refer to ways in which readers construct meaning from the text. Among the four comprehension processes, focusing on and retrieving explicitly stated information and examining and evaluating content, language, and textual elements are each targeted to account for about 20 percent of the assessment's score points, while making straightforward inferences and interpreting and integrating ideas and information are each targeted to account for about 30 percent of the assessment's score points.

Student reading behavior and engagement is assessed by the student background questionnaire, which will be further explained in the next slide.

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Each student completes the student background questionnaire after completing the assessment. The questionnaire asks about students' demographic characteristics, such as the language spoken at home; use of computers at home and borrowing books from libraries; participation in extracurricular activities; out-of-school reading; self-perceptions and attitudes related to reading; reasons for reading; perceptions about school, such as pertaining to school climate and safety; and perceptions about classroom reading instruction.

You can access the PIRLS student questionnaire, or any of the other PIRLS background questionnaires discussed within this section of the module, by clicking on the underlined screen text, 'questionnaire'.

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The teacher questionnaire is given to the reading teacher of each fourth-grade class sampled for PIRLS. Teachers were invited to fill out the questionnaire online, or they could fill out a paper version. This questionnaire asks teachers about the class size, reading levels and language abilities of the students, instructional time, materials and activities for teaching reading and promoting the development of students' reading literacy, classroom resources, assessment practices, home/school connections, teachers' attitudes such as views on opportunities for professional development and collaboration with other teachers, and teachers' education and training background.

The teacher questionnaire is designed to provide information about the teachers of the students in the PIRLS student samples. The teachers who complete PIRLS questionnaires do not constitute a sample from any definable population of teachers. Rather, they represent the teachers of a national sample of students.

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The principal or administrator of each school sampled for PIRLS is given a school questionnaire. Principals or administrators were invited to fill out the school questionnaire online, or they could complete a paper version. The questionnaire focused on community attributes, personnel, teaching assignments, policy and budget responsibilities, curriculum and instructional organization, enrollment, and student behavior issues.

Principals or administrators that complete the PIRLS school questionnaire do not constitute a sample from any definable population of principals or administrators. Rather, they represent the principals or administrators of a national sample of students.

PIRLS and TIMSS administered the same school questionnaire for fourth grade.

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First used in PIRLS 2006, the curriculum questionnaire is completed by the PIRLS National Research Coordinator (or NRC) within each education system, and focuses on the nature of the development and implementation of a nationally (or regionally) defined reading curriculum in primary schools. NRCs were asked to complete the questionnaire online.

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TIMSS is a paper-based assessment that includes both multiple-choice and constructed-response questions. It is constructed using multiple matrix sampling. This method, which utilizes Item Response Theory modeling, keeps testing burden to a minimum while ensuring broad subject-matter coverage.

Using this approach, all of the TIMSS mathematics and science items are assembled into blocks. In total there are 28 blocks, half of which consist of just mathematics items and half of just science items. There are 10-14 items in each block at grade 4 and 12-18 items in each block at grade 8.

At each grade, each student completes one of 14 booklets, each with four blocks of items. The blocks are distributed or “rotated” across these booklets, such that each booklet gets a different pair of mathematics blocks and a different pair of science blocks. This design enables TIMSS to adequately measure mathematics and science proficiency in each education system while limiting the number of items each student is asked to answer. This booklet design also reflects the distribution of mathematics and science content domains as specified in the framework. These content domains will be discussed later in this module.

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As shown in the table, at each grade a total of 14 mathematics blocks and 14 science blocks are assigned to 14 booklets in a systematic way that enables linking among booklets and balances position effects. Each student completes one booklet with 2 mathematics blocks (marked “M”) and 2 science blocks (marked “S”). Each of blocks M1 through M14 and S1 through S14 appear in 2 booklets, each time paired with a different block.

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In TIMSS 2011, there were a total of 347 items at grade 4 (175 mathematics items and 172 science items), and a total of 434 items at grade 8 (217 mathematics items and 217 science items).

TIMSS includes both multiple-choice and constructed-response items. Each multiple-choice question is worth one score point. Constructed-response questions generally are worth one or two score points depending on the degree of complexity involved. The 1-point constructed-response items are scored as correct (1 score point) or incorrect (0

score points), whereas 2-point constructed-response items are scored as fully correct (2 score points), partially correct (1 score point), or incorrect (0 score points). At each grade and subject in TIMSS 2011, about half of the score points came from multiple-choice items and half came from constructed-response items.

Calculators were not permitted during the TIMSS 4th-grade assessment. However, the TIMSS policy on calculator use at the 8th grade was to give students the best opportunity to operate in settings that mirrored their classroom experiences. Calculators were permitted but not required for the 8th-grade assessment materials. In the United States, all students were allowed, but not required, to use a calculator.

TIMSS results are presented in two ways: numerical scale scores and the percentages of students reaching defined international benchmarks. For each grade and subject, international benchmarks provide a way to interpret the scale scores by describing the types of knowledge and skills students demonstrate at various points on the TIMSS scale.

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You can obtain more information about the TIMSS assessment design, multiple matrix sampling, and how achievement data are scaled using IRT methods by clicking on the respective underlined screen text.

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As part of the TIMSS dissemination strategy, approximately one-half of the items at each grade are released for public use after each assessment cycle. To replace assessment items that have been released with items that closely match the content of the original items, education systems submit new items for review by subject-matter specialists, and additional items are written to ensure that the content, as explained in the frameworks, is covered adequately. Items are reviewed by an international Science and Mathematics Item Review Committee and field tested in most of the participating education systems. Results from the field tests are used to evaluate item difficulty, how well items discriminate between high- and low-performing students, the effectiveness of distracters in multiple-choice items, scoring suitability and reliability for constructed-response items, and evidence of bias toward or against individual countries or in favor of boys or girls. Grade-appropriate language and content is also evaluated for new field-test items. To view TIMSS items that have been publicly released, click on the underlined screen text: TIMSS released items.

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TIMSS assessments are developed to test students in various content areas within mathematics and science. Shown is the percentage of the TIMSS mathematics assessment’s score points (or “testing time”) targeted to each 4th grade mathematics content domain and each 8th grade mathematics content domain. Among the 4th grade content domains, number accounts for 50%, geometric shapes and measures accounts for 35% and data display accounts for 15%. For grade 8 mathematics content domains,

30% of the test's score points is targeted to be in the content area of number; 30% in algebra; 20% in geometry; and 20% in data and chance.

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Shown is the percentage of the TIMSS science assessment's score points (or "testing time") targeted to each 4th grade science content domain and each 8th grade science content domain. Among the 4th grade content domains, life science accounts for 45%, physical science accounts for 35% and earth science accounts for 20%. For grade 8 science content domains, 35% of the test's score points is targeted to be in the content area of biology; 20% in chemistry; 25% in physics; and 20% in Earth science.

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TIMSS focuses on three cognitive domains in each subject: knowing, which covers the facts, procedures, and concepts students need to know; applying, which focuses on the ability of students to apply their knowledge and conceptual understanding to solve problems; and reasoning, which goes beyond solving routine problems to include unfamiliar situations and context that may require multi-step problem-solving. The knowing domain is targeted to comprise 40% of the test's score points (or "testing time") for 4th grade mathematics and science, and 35% for 8th grade mathematics and science. At 4th and 8th grades, the applying domain is targeted to comprise 40% of score points for mathematics, 40% for 4th grade science, and 35% of score points for 8th grade science. The reasoning domain is targeted to capture 20% of 4th grade mathematics and science score points, 25% of score points for 8th grade mathematics, and 30% of 8th grade science score points.

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Each student taking the TIMSS assessment completes the student background questionnaire, which is received at the end of their assessment booklet. The questionnaire assesses student demographic information, home educational resources, beliefs and attitudes about learning mathematics and science, self-confidence and perception of mathematics and science lessons, school climate, and homework.

You can access the TIMSS student questionnaire, or any of the TIMSS background questionnaires described within this section of the module, by clicking on the underlined screen text 'questionnaire'.

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The teacher questionnaire is given to the mathematics and science teachers of the students assessed in TIMSS. Teachers are invited to fill out the questionnaire online, or can complete a paper version. This questionnaire asks about topics such as attitudes and beliefs about teaching and learning mathematics and science, teaching assignments and topics covered in class, class size and organization, the use of various teaching tools, instructional practices, professional preparation, and continuing development.

The teacher questionnaire is designed to provide information about the teachers of the students in the TIMSS student samples. The teachers who complete TIMSS questionnaires do not constitute a sample from any definable population of teachers. Rather, they represent the teachers of a national sample of students.

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The principal or administrator of each sampled school is asked to complete a questionnaire focused on community attributes, personnel, teaching assignments, policy and budget responsibilities, curriculum and instructional organization, enrollment, and student behavior issues.

Principals or administrators were invited to fill out the school questionnaire online, or they could complete a paper version. Those that complete the TIMSS school questionnaire do not constitute a sample from any definable population of principals or administrators. Rather, they represent the principals or administrators of a national sample of students.

PIRLS and TIMSS administered the same School questionnaire at grade 4, however a separate TIMSS school questionnaire was administered at grade 8.

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As mentioned previously, each PISA administration focuses on one subject (reading, mathematics, or science) in particular, although all three subjects are assessed. Each subject is a major domain every 9 years. For example, as seen in the table here, in 2000 and 2009, the focal subject was reading literacy, and therefore it appears in all capital letters. In 2003 and 2012, mathematics literacy was the focal subject. In 2006 and 2015, science literacy was the focal subject. Subscales are assessed only for the focal subject for each administration. PISA also includes measures of general or cross-curricular competencies. For example, a portion of the 2003 assessment was devoted to general problem-solving and PISA 2012 included computer-based problem-solving. In PISA 2012, the U.S. participated in the international options of computer-based assessment in math and reading, as well as financial literacy. The PISA 2015 assessment was entirely computer-based and focused on science. It also assessed reading, mathematics, and collaborative problem-solving, as well as financial literacy as an optional assessment.

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Historically, PISA has been a paper-based assessment (or PBA). In 2012, computer-based assessments (or CBAs) in mathematics and reading were offered as optional assessments for participating education systems. PISA data collection was administered solely through the computer in 2015.

Assessment items include a combination of multiple-choice questions, closed- or short-response questions (for which answers are either correct or incorrect), and open-constructed-response questions (for which answers can receive partial credit). PISA

results are presented in two ways: numerical scale scores and the percentages of students reaching selected levels of proficiency in each subject area. Proficiency levels provide a way to interpret the scale scores by describing the types of knowledge and skills students demonstrate at various points on the PISA scale.

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PISA is constructed using multiple matrix sampling. This method, which utilizes Item Response Theory modeling, keeps testing burden to a minimum while ensuring broad subject-matter coverage.

Using this approach, all of the PISA items are assembled into clusters. For the paper-based assessment, the clusters are distributed or “rotated” across multiple booklets, such that each booklet gets a different set of item clusters. This design enables PISA to adequately measure the literacy areas in each education system while limiting the number of items each student is asked to answer.

For more information on multiple matrix sampling, click the underlined screen text, ‘Principles of Multiple Matrix Booklet Designs and Parameter Recovery in Large-scale Assessments. Additionally, researchers can learn more about how achievement data are scaled using IRT methods by clicking on the underlined screen text, ‘PISA Technical Report’.

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In the PISA 2012 paper-based assessment there were 7 clusters of mathematics literacy items, 3 clusters of science literacy items, 3 clusters of reading literacy items, and 2 clusters of financial literacy items. A total of 17 test booklets were administered (or 13 in education systems that did not administer financial literacy), and each booklet consisted of 4 clusters of items as shown in the diagram. Each student received one test booklet, which is about 2 hours of testing time (that is, about 30 minutes per cluster). This assessment design ensured that an adequate, representative sample of students responded to each cluster of items.

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This slide shows the number of items that were assessed in each subject, for each PISA assessment cycle. The item counts which are bolded denote that that subject was the major domain of that cycle. As you can see, there are a higher number of items assessed for the subject that is the major domain of that assessment cycle.

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In PISA, approximately 50% of the items are multiple-choice items, 20% are closed- or short-response items, and 30% are open constructed-response items. Items other than multiple-choice are graded by trained scorers using an international scoring guide specific to each item that explained the requirements for each score level.

Multiple-choice items are either (a) standard multiple-choice, with a limited number of responses from which students are required to select the best answer; or (b) complex multiple-choice, which present several statements, each of which require students to choose one of several possible responses, such as true or false, correct or incorrect, etc. Closed- or short-response items include items that generally require students to construct a response that was simply either correct or incorrect. Open constructed-response items require more extensive writing or, for mathematics items, showing a calculation, and frequently include some explanation or justification. These were graded by trained scorers using an international scoring guide. Pencils, erasers, rulers, and in some cases, calculators are provided. Calculators are always provided to U.S. students

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In 2012, a computer-based assessment (or CBA) in general problem solving was administered in 44 education systems, including the United States. Computer-based assessments in mathematics and reading were offered as optional assessments for participating countries. Thirty-two education systems (out of 65), including the United States, chose to administer them. In these education systems, a subset of students who took the paper-based assessment was also assessed on computer. The CBA contained 24 forms, each made up of two clusters that together contained 18 to 22 items. Altogether there were 4 clusters of problem-solving items, 4 clusters of mathematics items, and 2 clusters of reading items. Each cluster was designed to take about 20 minutes to complete.

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The interactive nature of computer-based assessment allowed PISA to assess students in novel contexts that are not possible with a traditional paper-based format. For instance, the computer-based mathematics assessment was designed to measure the same mathematics content and processes as the paper-based assessment, but the computer-based environment provided the opportunity to include tasks requiring students to manipulate mathematical tools like statistical software, geometric construction, visualization utilities, and virtual measuring instruments. And, while individuals use many of the same reading processes and skills when they are reading print or reading online, there are reading processes that are unique to an electronic environment, such as navigation across multiple sites without explicit direction or using web-based navigation tools such as drop-down menus. The computer-based reading assessment was designed to investigate students' proficiency in that context. For both mathematics and reading, the paper-based assessment and computer-based assessment were scaled separately. Therefore, scores on the paper-based assessment cannot be compared to scores on the computer-based assessment. PISA was exclusively computer-based in 2015.

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As part of the PISA dissemination strategy, to replace assessment items that had been released for public use, new items were developed by international experts and PISA Consortium test developers, and items were reviewed by representatives of each education system for possible bias and relevance to PISA's goals. The assessment included items submitted by participating education systems as well as items that were developed by the Consortium's test developers.

Results from the field test were used to evaluate item difficulty, how well items discriminated between high- and low-performing students, the effectiveness of distracters in multiple-choice items, scoring suitability and reliability for constructed-response items, and evidence of bias toward or against individual countries or in favor of boys or girls. Age-appropriate language and content is also evaluated for new field-test items. To view PISA items that have been publicly released, click on the underlined screen text: PISA released items.

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For PISA, students are also expected to demonstrate their proficiency in five aspects of reading literacy competency: retrieving information, forming a broad understanding, developing an interpretation, reflecting on and evaluating the content of a text, and reflecting on and evaluating the form of a text. These five aspects make up the bottom row of the chart.

In order to include sufficient items in the PISA assessment, reporting on each of the five aspects as a separate subscale would be impractical. So, in PISA, reports on reading literacy for these five aspects are organized into three broad categories: access and retrieve, integrate and interpret, and reflect and evaluate. These three broad aspect categories can be found in the middle of the chart.

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Twenty-two percent of the score points in the PISA reading literacy assessment reflect the reading aspect of access and retrieve. The same percentage of score points are also designated to the aspect of reflect and evaluate. A little over half, or 56%, of score points are dedicated to the aspect of integrate and interpret. From its inception, PISA's assessment of reading literacy has used both continuous texts, or prose organized in sentences and paragraphs, and non-continuous texts. Continuous texts are distinguished by a range of prose forms, such as narration, exposition and argumentation. Non-continuous texts present information in other ways such as in lists, forms, graphs, or diagrams.

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The situation and context of texts used in PISA are defined by the use for which they were constructed. For example, a novel, personal letter, or biography is written for people's personal use, both practical and intellectual; official documents or announcements are written for public use; a manual or report is for occupational use; and a textbook or worksheet is for educational use. Since some groups may perform better in one reading situation than in another, it is desirable to include a range of types of reading in the assessment items.

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PISA identifies four overarching ideas that represent broad categories of real-world phenomena through which opportunities to explore and use mathematics arise in our interactions with the world. The content categories include: quantity, change and relationships, space and shape, and uncertainty and data. These four categories characterize the range of mathematical content that is central to the discipline and relate to familiar curricular strands such as numbers, algebra, and geometry in overlapping and complex ways.

The mathematics literacy assessment is about evenly divided among the four mathematics content categories, with each content category representing a quarter of the score points. It is important to note that items in each content category are developed with a range of difficulty and mathematical demand.

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Mathematical processes are what students apply as they attempt to solve problems in PISA. The individual mathematical competencies reflect the way that mathematical processes are typically employed when solving problems that arise as students interact with their world. Such skills, however, are not separated out in different test items, since it is assumed that a range of cognitive processes will be needed to perform any given mathematical task. These processes include formulating situations mathematically; employing mathematical concepts, facts, procedures, and reasoning; and interpreting, applying, and evaluating mathematical outcomes.

A quarter of the items in the mathematics assessment reflect the process of formulating, half reflect the process of employing, and a quarter reflects the process of interpreting. To measure the full range of student performance, the set of items reflects all levels of difficulty.

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An important aspect of mathematical literacy is engagement with mathematics: using and doing mathematics in a variety of situations. The situation is the part of the student's world in which the tasks are placed. The four situation types defined and used for problems to be solved are: personal, occupational, societal and scientific. For PISA, the closest situation is the student's personal life. Next would be school life, then work

life and leisure, followed by the local community and society as encountered in daily life. Scientific situations are furthest away.

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The PISA science assessment gives priority to three competencies: the ability to identify scientifically-oriented issues; to describe, explain or predict phenomena based on scientific knowledge; and to interpret evidence and conclusions, and use scientific evidence to make and communicate decisions.

Twenty-three percent of the score points in the PISA science literacy assessment reflects the science competency of identifying scientific issues, with 41 percent for explaining phenomena scientifically and 37 percent for using scientific evidence.

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The PISA science literacy assessment is designed to measure students' scientific knowledge and their capacity to use this knowledge effectively, as they carry out certain cognitive processes that are characteristics of science and scientific enquiries of personal, social, or global relevance. PISA uses the term scientific knowledge to refer to both knowledge of science and knowledge about science.

Knowledge of science refers to knowledge of the natural world across the major fields of physics, chemistry, biological science, Earth and space science, and science-based technology. It includes understanding fundamental scientific concepts and theories. In PISA, while these concepts are familiar ones, they are applied to the content of the assessment items and not just recalled.

Knowledge about science refers to knowledge of the means (scientific inquiry) and goals (scientific explanations) of science. Scientific inquiry is concerned with the process of obtaining data and the various components of that process. Scientific explanations are how the data is used and are the results of scientific inquiry.

The table demonstrates the distribution of score points by scientific knowledge. Knowledge of science consists of about half of the score points; 13% of score points for physical systems, 16% for living systems, 12% for earth and space systems, and 9% for technology systems. Knowledge about science makes up about half of the score points. Its two categories contain the largest percentage of score points; scientific inquiry at 23% and scientific explanations at 27%.

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An important aspect of the PISA science assessment is engagement with science in a variety of situations. In dealing with scientific issues, the choice of methods and representations is often dependent on the situations in which the issues are presented. The situation is the part of the student's world in which the tasks are placed. Assessment items are framed in situations of general life and not limited to life in school. In the PISA science assessment, the focus of the items is on situations relating

to the self, family and peer groups (personal), to the community (social) and to life across the world (global). The main areas of application are: health, natural resources, the environment, hazards, and the frontiers of science and technology. They are the areas in which science has particular value for individuals and communities in enhancing and sustaining quality of life, and in the development of public policy.

More information about the PISA framework can be accessed by clicking on the underlined screen text, ‘PISA 2012 Framework.’

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To provide context information for understanding achievement, students complete a 30-minute questionnaire providing information about their backgrounds, attitudes, and experiences in school. Items collect information about demographics and socio-economic background; student attitudes such as interest in and enjoyment of math and work ethic; immigration status; cultural possessions and home resources such as books and room to study; time spent learning both in and out of school; study strategies and activities; information about student perceptions of instructional practices and learning; and the student perceptions of disciplinary environment.

You can access the PISA student questionnaire, or any of the other PISA background questionnaires discussed within this section of the module, by clicking on the underlined screen text, ‘questionnaire’.

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The principal or administrator of each participating school also completes a 30-minute questionnaire about school characteristics. The items on this questionnaire collect information about school structure and organization; the student and teacher bodies; school resources; instruction, curriculum, and assessment; school climate; policies and practices; and principal or administrator characteristics.

Principals or administrators were invited to fill out the school questionnaire online, or they could complete a paper version. Those that complete the PISA school questionnaire do not constitute a sample from any definable population of principals or administrators. Rather, they represent the principals or administrators of a national sample of students.

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Starting with the 2015 administration of PISA, teachers in each participating school (that is, those eligible to teach grade 10, the modal grade in PISA) complete a 30-minute online questionnaire. In 2015, when science was the focal subject, up to 25 teachers (10 science teachers and 15 non-science teachers) were randomly selected in each participating school. The science teachers and non-science teachers were administered separate questionnaires, with items pertaining to teacher‘s background, initial education and professional development, collaboration with parents and other teachers, teacher‘s

beliefs and attitudes, teaching practices in the classroom, and the availability of school resources related to instruction.

Teachers were invited to fill out the school questionnaire online, or they could complete a paper version. Those that complete the PISA teacher questionnaire do not constitute a sample from any definable population of teachers. Rather, they represent the teachers of a national sample of students.

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This module has provided you with more detailed information about some of the topics and components of the studies described within the introductory module. Specifically, this module focused on the data collected through the student assessments and contextual questionnaires. The module's objectives and the resources provided throughout the module are summarized here for your reference.

You may now proceed to the next module in the series, or click the exit button to return to the landing page.